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Interactive comment on "The pan-tropical response of soil moisture to El Niño" *by* Kurt C. Solander et al.

Anonymous Referee #2

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The manuscript "The pan-tropical response of soil moisture to El Niño" evaluates the quality of the GLDAS soil moisture dataset and uses GLDAS to investigate response of soil moisture to three recent "super El Niño" events. The study is of interest to a broad scientific community, including researchers in hydrology, ENSO dynamics, and land-atmosphere interaction. The paper is well written. But the current manuscript can be improved in both analysis and paper structure. Therefore I recommend major revisions before being considered for publication in HESS. Major suggestions: 1) On paper structure, although the title implies a scientifically oriented study, namely response in tropical soil moisture to El Niño, the paper emphasizes the technical parts, namely evaluation and bias correction of GLDAS, probably too much. I suggest keeping the title and scientific emphasis of the paper, while merging some of the discussion about

data quality and bias correction into the main results/discussion. For example, it might be more convincing if you use the bias-corrected data in Figures 5-9, since you suggest the bias-corrected data is better than the original in Figure 10. You can keep the figures from original data in supplemental and briefly discuss the difference between the original data and bias-corrected data. 2) On analysis, you might consider an alternative or additional way of doing k-means clustering analysis. Currently, the clustering is done for each case separately. While there is advantage of doing this, the disadvantage is that the spatial distribution of clusters you get varies by each El Niño event, making the comparison of clusters between different events (Tables 3-6) a little apple-to-orange. I suggest you to repeat the k-means clustering analysis with all three events together - a multi-dimension k-means clustering analysis. In this way, you should be able to get better summary of the results, for example you can directly tell which regions have the most robust (consistent) response to all three events. Then readers can clearly see each cluster from all three events, their spatial distribution, their response sign and magnitude. I think it worths trying this way at least.

Minor suggestions: 1) You might consider adding the bias-corrected line to Figure 1. 2) Add continental outlines in Figure 6.

Interactive comment on Hydrol. Earth Syst. Sci. Discuss., https://doi.org/10.5194/hess-2019-535, 2019.